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PAPER

Time Fluctuation Models to Forecast Tea Production, Prices and Exports in Sri Lanka.

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The production and consumption of tea worldwide have increased over the past decade, and this increase is expected to continue. The tea industry is a key component in the Sri Lankan economy, and is a leading foreign income generator. Sri Lanka is the world's fourth largest producer of tea. The industry mainly consists of tea production, tea export and tea auctions. Being a crop which contributes greatly to the Sri Lankan economy, it is very important to be aware of the future fluctuations in tea production, prices and exports.

The objective of this study is to identify predictive models to forecast monthly tea production, prices and exports. Based on the time series analysis, Seasonal Auto Regressive Integrated Moving Average (SARIMA) models were fitted to forecast the monthly tea production and tea exports.

The study was undertaken by using the data from the Sri Lanka Tea Board. Monthly black tea production and price data were considered from 1988 to 2009, and tea export data for six tea categories namely Bulk, Green, Instant, Packeted, Other tea and Tea bags, were considered from 1996 to 2010.

There was a little upward trend and a seasonal pattern in both production and export data. Since the series is non-stationary, seasonal differencing procedure was required and the 1st seasonal differenced series was generated by a non-stationary process. With the use of calculated parameter estimates, Box-Pierce (Ljung-Box) Chi-Square statistic and residual analysis, it was found that the most suitable model to forecast the monthly black tea production is SARIMA(3,0,3)(0,1,1)₆ and the best model to forecast total tea export is SARIMA(1,0,2)(0,1,1)₁₂.

Monthly average black tea prices at Colombo auctions were forecast using polynomial regression model. Among linear, quadratic and cubic regression models, cubic regression model was the most suitable model with the R² value of 91.3%. The fitted regression equation is, Price = 34.36 + 0.9943 (Time Index) - 0.006900 (Time Index)² + 0.000029 (Time Index). Time Index is the notation of time between the considered time period in months and it explains the tea prices with an accuracy of 91.3%. The identified forecasting models will help to study future fluctuations in the tea industry.